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ABSTRACT

Changes that computer technology has brought about in higher education and skills needed by faculty and students are discussed. Computer/information literacy is important in higher education and in graduates' work after college. Tools introduced by technology include: microcomputers connected to the university's central computer, electronic mail systems for exchange of messages, electronic files for storing and sharing information, an electronic forum by which a group of people interact on topics of mutual interest, obtaining information from databases on educational literature, text sharing, word processing software that is useful in writing, and spreadsheets for doing budgets. To take advantage of information technology, the user needs to find and manipulate the text of others through computer searching and retrieval. Mastering the rules of a particular machine and using the computer to scan a text are important skills. Efficient word processing is addressed briefly, along with a variation on word processing called outline processors or idea organizers. The use of electronic text raises the following issues for college administrators and faculty: costs; teaching skills in information-handling; and research on usage patterns, implementation, impacts on academic products, and psychological and social consequences. (SW)

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INFORMATION LITERACY: ACADEMIC SKILLS FOR A NEW AGE

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INTRODUCTION

Today, the job of the academic in higher education is much the same as it was 100 years ago -- read and digest quantities of text, debate ideas, develop new syntheses and visions, express them in words (handwritten, typed or printed), and instruct students in the essentials of the discipline through face-to-face lecturing, discussion, tutoring and feedback. While the tasks are much the same, the tools available to accomplish these tasks are undergoing revolutionary change.

The essential tasks for students in higher education have not changed much either -- read texts, listen to oral lecture, respond to queries about mastery of content, engage in discussion and debate about issues, and compose essays that demonstrate the ability to select, read, synthesize and argue about a variety of topics. While the tasks are much the same, the tools available to students are also changing.

The new tools for the academic and student are based on the computer and the peripheral storage devices which have led to the development of electronic text. Equipped with appropriate software, the computer has provided a host of tools that make the task of information processing -- storing, classification, retrieval, and production -- not just faster and more efficient, but different in its very character. This paper describes the nature of some of these changes and argues that those in higher education -- faculty and students -- must become literate in the skills of electronic information processing, both to better accomplish the tasks of education and -- for students -- to better prepare for the realities

of today's world of work. The argument of efficiency is put forth tentatively. While those who are promoting this form of communication clearly tout the efficiency theme, it remains an open issue to be tested -- especially in academic endeavors.

THE TOOLS OF ELECTRONIC INFORMATION PROCESSING

The range and breadth of new tools are most easily described by personal anecdote. I began this morning at my office at home. With the aid of a telephone and modem, I connected my personal microcomputer to the university's central computer. It handles hundreds of simultaneous users; most importantly it maintains devices which allow for sharing of electronic text among all its users. I checked my electronic mail box for messages from colleagues and students; although not all staff and students communicate in this way, a number of us who are physically distant from one another use it to make appointments and solve minor problems without playing telephone tag. In one message the dean asked if I had the citation for an article he needed. In another, a co-investigator on a proposal had just finished a new version of his part of the text; he told me the name of the electronic file in which I could find the text and asked that I critique it, make any changes I deemed appropriate, and notify him by return message when I had finished.

While still connected to the central computer, I checked for recent activity on two computer conferences to which I belong. A conference is an electronic forum in which a group of people interact on topics of mutual interest. Most of the interchange is public in the sense that all members of the conference see the input of others. Using a computer terminal, each conference member, at his own convenience, connects with the conference, reads what others have said recently about the topics being discussed. If the member is motivated by the "discussion" of any topic, he/she types in comments which others will see when they next check in. One of my conferences is for a class I teach in electronic learning. Some of my students live in town, although not close to one another; others live 25-50 miles away. The class meets once a week for

three hours. In the computer conference students continue discussion of issues raised in class. Some topics are stimulated by my lectures; others are generated by students based on assigned readings or term projects. Today, I found some additional discussion on the topic, "can computer simulation be made self-instructional, or does it require mediation by an expert to make it useful?" In another item a student indicated he was having trouble making his terminal work correctly; another student -- familiar with his brand of terminal -- suggested a switch setting that should be changed. By the end of the term students will have logged about 24 hours on the conference; about two-thirds of that time represents fruitful extensions of class time. At the end of the term, most of the papers they submit will have been written using a word processor.

Next I switched to conference devoted to research issues surrounding the topic of children and computers. A year ago, a group of 15 faculty, graduate students and school administrators formed a working group devoted to exploring this topic. We have been meeting every three weeks for face-to-face discussions. In between meetings business is carried on using this electronic conference. Today there was activity on three topics: identification of speakers for our forthcoming live conference, a report from one member on a relevant national meeting he had just attended, and a request from one of the task groups for suggested additional readings.

As a third task I connected with the Dialog computer in California to search the ERIC database of educational literature. I am writing a review paper on electronic learning and I wanted to search for references I might have missed in a review of my personal journals. I made an electronic copy of the abstracts of two articles that looked relevant, but that I had overlooked. I disconnected from the connection with California and linked to the local electronic version of my university library's card catalog. I wanted to see if these references were in the holdings of our library and available for check out.

Now that my work with the outside world was finished, I

disconnected from the telephone lines to do a number of local computer activities. I added the new references to my personal bibliographic file. This data base stores all of my citations and notations for books and articles that I need for various research and writing activities. The present essay was written using a microcomputer equipped with word processing software. This allows easy manipulations of text to reflect a different organization or a stylistic change that makes for more persuasive text. On my last reading of this essay I noted two places that could be improved. For one, I felt that a more powerful opening paragraph would be helpful. Replacing the existing one required little more than "pointing" to it and typing a replacement. In another part of the paper I recognized the value of adding a paragraph from another paper I had written. I "opened" up the electronic file for the other paper, instructed the computer to make an electronic copy of the desired paragraph, re-opened the file for this paper, and instructed the computer where to insert it. Instantly the computer reformatted and repaginated the paper to accomodate the new text. The revised paper was ready for printing without ever dealing with a secretary.

The budgets in my department are all done using a "spreadsheet" program. For a proposal I am writing I revised the budget. The current version was higher than my sponsor would allow. I guessed that a reduction in the amount of time I committed to the proposed project might be sufficient to bring the total within the guidelines. An electronic "spreadsheet" program allowed me to verify this hunch immediately. When I inserted the lower fraction of time for myself, the program recalculated all of the budget. When I saw that this change brought the total within sponsor guidelines, I printed out the revision. Again, I had saved a great deal of clerical time that used to be required to recalculate and then retype the budget.

A last task was a letter. The addresses of my frequent correspondents as well as the format I use for my letters is stored in the computer. The format is stored as a "shell" or "style sheet". It includes the letterhead, the formatted locations for the date, inside address, and salutation, and the standard "sincerely yours" closing that I use. By and large I need think only about the letter's

message. When I have finished the text it is ready to be printed and sent out. Later, when I got to the office I would address the envelope, but no one would be needed to retype the letter (and perhaps make a few typos). Even "second thoughts" about the text are quickly handled, so I don't need to debate whether a small change is worth a secretary's time to retype the letter.

In one hour I had processed a great deal of information. I had accomplished it without many of the delays associated with face-to-face communication and negotiation with support staff or colleagues. The efficiency represented by accomplishing it with a friendly machine that did not need to be cajoled, trained or persuaded to do the task insured my returning to the computer tomorrow to continue this type of work. Electronic communication of this type is not without its costs; one must learn the commands and be sufficiently familiar with the "hardware" to keep the system operational. But in balance these are investments -- costs that are outweighed by the benefits.

The purpose of these anecdotes is to illustrate the nature of today's technological capabilities. Each of the examples is taken from my own work, and represent current capabilities on many campuses. They typify the types of capabilities in use in many of the organizations to which our students will go upon graduation. The tools of information processing are changing rapidly. It is incumbent on university faculty to be familiar with these tools, and to train students to be skilled in them, and even to appreciate how they ARE only tools. While they don't represent replacements for scholarship -- critical reading, thinking, and composition -- they are potentially valuable tools for the conduct of scholarship.

SKILLS FOR A "HARD-TEXT" EDUCATION

The traditional pattern of intellectual activity in college revolves around "hard text." Let this term encompass the way that information is both generated and distributed. Thus, a person desirous of information on a topic consults a variety of printed sources including books, journals and magazines. The text itself

might be original source material, a textbook or guide to textual material such as an index or collection of abstracts. If the person wants to transmit information to others, and doesn't want to use oral methods, he/she will set down with a writing instrument -- pencil, pen or typewriter -- and commit the ideas to paper. Hard text, then, is the medium used for the exchange of information.

Developing the skills to decode and encode hard-text information is one of the major tasks of education. Students are taught how to read and write. At the elementary school level this entails rudimentary decoding and encoding skills such as translation of words, sentences and paragraphs. At intermediate and advanced levels decoding involves speed reading, reading for meaning, note-taking, and research skills appropriate to the finding and decoding of reference material (locating references of various types in libraries and other collections, taking notes on index cards and cross-classifying ideas). Encoding includes the rules of sentence structure, vocabulary building, outlining and organization of ideas, and what might be called the etiquette or norms of writing. Over the years there have evolved norms for every form of written communication: business letter, personal letter, essay, book review, essay and research paper. These norms are based largely on audience considerations and add an additional layer of meaning to the words. In a business letter, the inside address, the salutation, the closing and even some parts of the text are stylized conventions. By using them an author conveys a social message designed to elicit a desired response from the recipient.

Similar expectations surround the use of conventions in other forms of writing. The research paper has a definite structure, including such parts as the introduction, a review of previous work on the topic, the design of a study to address pertinent issues or hypotheses, the presentation of data, the development of arguments using data, the closing summary, and the bibliography.

An important aspect of writing a research paper (and a difficult concept to teach) regards the ownership of ideas. An author is supposed to read and digest the ideas of others. If the ideas are appropriate to the author's argument, then they need to be expressed

in the author's own words or enclosed in quotes to indicate the exact representation of someone else's ideas. It is prohibited to copy another's text without quotation marks -- we call it plagiarism, and its commission is highly unacceptable. Conversely, it is inappropriate to use too many quotations, since this is interpreted as evidence that the author lacks original ideas.

SKILLS FOR AN "ELECTRONIC-TEXT" EDUCATION

Dealing with electronic text has many similarities to hard text. After all, words and sentences convey the same meaning whether they flicker on a screen or appear as black print on white paper. But there are imporant differences as well. These are associated with the identification, selection and retrieval of text; its manipulation once found; rapid decoding of the text iteself; and the expression of ideas in a medium for which etiquette or norms of expression have yet to be established.

Finding and Manipulating the Text of Others

As more and more text is maintained in an electronic form, it becomes incumbent on a reader to know how to find and retrieve such information. Until recently, electronic information was of limited use to the academic professional or student. There were a limited number of journals and other sources of information for each field of study. Each of these had regular indices published at the end of each volume. In short, the volume of relevant print information was manageable by a serious scholar. Couple this with the limited number of electronic databases available from Dialog and other services, and the difficulty of accessing such data -- scarce and unfamiliar tools such as terminals and modems -- and there was little motivation to pursue the electronic avenue of information retrieval. A few bibliographic databases could be accessed electronically, but for the one or two times a year it seemed appropriate it was easy enough to ask a librarian or research assistant to do the task and deliver a hard copy of the results.

In recent years, the amount of information has proliferated in most

fields. There are many more publications, ranging from journals and books to relevant technical reports. At the same time comprehensive data bases have become available -- Dialog in Palo Alto, California, lists two hundred, including several each in areas as diverse as education, business news, biographies, agriculture, engineering, law and medicine. Couple this with the proliferation on campuses of inexpensive hardware and software, and many scholars and students are coming to place a high value on getting their information in this way. As campuses become increasingly saturated with computing power, the forces are there to alter the norms for how information is obtained. Consider the task of ascertaining whether the campus library contains a needed volume. It is easy to choose the electronic solution, given the choice of spending an hour or two walking from a department office to the library to do the search manually, or turning on the department terminal and discovering the answer in a few minutes. Similarly, with an electronic bibliographic database. Why wait a week for a librarian to execute a search and obtain hard copies of abstracts when an hour of time spent at a terminal can find the information more expeditiously?

The skills for data retrieval are of two types. One is the specific set of commands needed to carry out the activity described by the designers of the databases; how to "dial up" the data base, how to "log on", and what commands need to be given to locate and retrieve the desired information. Equally important are general skills in efficient use of electonic text to facilitate subsequent use of the information. One of the great advantages of having information in an electronic form is the ability to search for key ideas or concepts, select them, and copy them to one's own electronic files. Microcomputers (both stand-alone and those serving as links to other computers) follow a variety of protocols, but essentially they all allow the user to copy and move portions of text for subsequent local use. This is the similar to photocopying hard text, but it is different in that a person can easily re-arrange the copied text and incorporate it instantly into a new piece of text. This can be a source of great efficiency (or a facilitator of plagiarism). It is a great convenience to add newly found references to an existing bibliography of one's own, or to copy abstracts to a section where

one is compiling new ideas on a particular topic. Each of these activities entails the development of general file management skills, although their implementation is tied to a particular configuration of hardware and software.

How Big is the Page? How Thick is the Book?

There are other more rudimentary skills associated with the consumption of electronic text. As you, the reader, decode this text you unconsciously employ skills you learned a long time ago to manipulate print text. You know the paper's approximate length (and thus the time required for you to read it) by a calculus which includes your knowledge of the subject matter, the size of the type face and the text block, and the number of pages -- ascertained by feeling the thickness or actually counting the number of pages. The values for the variables in this calculus are easily obtained by scanning a single page to ascertain which of a number of standard parameters for text dimensions were used and then shuffling the pages. Electronic text is different. A given amount of text will look different, depending on the computer and monitor being used. On one machine a block of 200 words may fit on one screen; on another it may require two screens. More importantly, a screen of text is not related to the size of a page of text from the print medium. A user of electronic text must learn the conventions of a particular machine. Other skills are related to scanning electronic text. With hard text a reader doesn't limit his concentration to the few sentences he is immediately reading. He visually scans prior and subsequent material, and physically "flips through" the pages as part of mentally building a sense of the whole text. He may be looking for a topic heading, or figuring out where in the overall flow of an argument an idea fits. Children learn these skills for hard text in the elementary school years, but electronic text scans differently; there are no pages to flip; there are fewer visual markers to help locate or fix points in human memory. One must learn the equivalent of "thumbing through" hard text -- how to make a computer scan the text, picking up cues such as section headings and total length to facilitate this type of decoding. This entails a combination of learning the commands required to move the text forward and backward on the screen, and using them enough to acquire the "feel" for text that has fluid borders.

SHARING IDEAS WITH OTHERS

Word Processing and Touch Typing

The most common electronic enhancement of communication is computer-based word processing. Word-processing software allows an author to generate text that is truly fluid, in the sense that it can be easily corrected or re-arranged to suit the author's needs. At any time the most current version of the text can be printed, removing the clutter of crossed-out words and curcuitous arrows designed to lead the reader through the convoluted path of reorganized thoughts. Correcting so-called "typos" is the least of its attractions. More important is the capacity word processing gives the author to easily move around text within the body of the composition, in response to a reorganization of thinking about a topic. While it is not known whether this influences the quality of the written product, it is sufficiently attractive to lead experienced authors to assign great value to their word processing software. For the present, at least, word processing is being adopted increasingly by those who write. As with electronic text retrieval, this is the mode of text handling being adopted widely throughout business and industry -- the destination for most of the graduates of our colleges.

What skills are needed to become efficient at word processing? As with other electronic enhancements, basic training is needed in the specific commands associated with the word-processing software selected by the user. This can range from extensive training for some of the sophisticated word- and text-processing packages (e.g., Wordstar) to very little training for the "what-you-see is what-you-get" wordprocessors such as MacWrite, the standard word processor for the Macintosh. Undoubtedly, the ease of operation associated with programs such as MacWrite will become commonplace with most processors within a few years, and extensive training will not be necessary.

The most important skill required for using all word processors is touch typing. Currently, there are no shortcuts for entering text. Authors must learn how to type fast if the entry process is not going to stand in the way of rapid expression of ideas. Educational

institutions should consider how this skill can be efficieently taught to those in need. Courses in this subject can be offered, but there are excellent tutorial computer programs whereby a motivated individual can learn without attending a structured class.

Outline Processors

A variation on word processing is a class of software variously referred to as outline processors or idea organizers. This software allows an author to enter thoughts and ideas either randomly or with some preliminary organization, and then reorder the ideas into a logical format. The outline is started by entering main ideas as headings. New ideas can be placed as sub-headings under these main ideas or made into their own main headings. The software remembers the level of outlining given to the idea. At any point an idea can be expanded as inspiration strikes or needed information is found. Some outline processors, such as ThinkTank, allow the elaborations to be displayed or hidden, depending on whether one wants to look at details or stand back and get the big picture of the essay being written. Ultimately, one is trying to build an ordered hierarchy of ideas that represents a coherent whole. The outline processor helps the author construct this whole by providing a flexible scaffolding. Such tools have yet to prove their worth, but -- in published reviews -- experienced authors have expressed their satisfaction.

A possible variation might emerge for college writing. As pointed out earlier, there are standard formats associated with different types of writing: essays, research papers, business letters. If an outline processor contained the "shell" for some of these forms, it could provide a standard organization for a student author which could be very helpful. This has proved true at the elementary school level with the Quill authoring system; its equivalent at the college level could prove useful as well. Departments could develop shells appropriate to their needs. Chemistry might have one for lab reports, psychology for social science research reports, and communications for newspaper stories.

Sharing Text

Sharing text is an important aspect of developing finished ideas.

This is true for academic co-authors of a scholarly paper and for academic teachers who read and provide critical comment on students' text. This sharing is commonly done by one author putting words on paper, another reading the text and writing reactions in the margins or on a separate sheet of paper. As more text is made electronic, an analog capacity is needed. This is emerging with software that permits multiple "windows" to be worked on simultaneously. A monitor's screen is split into two or more "windows" or separate work areas that are simultaneously active. In one window appears the original text; in a companion window on the same computer screen is a place to enter comments on the original text. The presence of comments is noted by a special mark on the original text, and the original author can call for the comments with a simple command. When this capacity to share is fully realized in future software it presents intriguing possibilities for collaboration and critiquing. Co-authors. or dads ofstudent author and teacher, could convey critical comment very expeditiously by swapping discs. With computer networking this could even be done at a distance without ever physically exchanging disks. As with other electronic enhancements, its use would require extensive experience with the new hardware and software.

Electronic Mail and Computer Conferences

There is considerable interest today in the electronic exchange of correspondence. Electronic mail is a way of leaving messages for others that can be retrieved at their convenience. It is a potential timesaver; unlike a telephone call, the two parties do not need to be available at the same time. Electronic conferencing is electronic mail that can be viewed and commented on by a group of people. It is a way of carrying on group discussions without necessitating face-to-face meetings. Both of these require the usual knowledge of commands necessary to carry on the interactions. In addition, they represent a new form of correspondence. Letters and face-to-face meetings have their etiquette, or standard forms. These are based on conventions regarding addressing people according to their status. In electronic communication, the status of the correspondent is often not known. Participants in an electronic conference often know little about one another. In addition, this form of interaction is unique. When a word processor

is used to create a book review, the form is still the same. A book review is a known style which students have practiced in various language arts classes. Computer conferencing is not known in this way.

Special Tools

At present there are a limited number of tools available for the computer. In addition to the ones already named, the major classes are data bases and spread sheets. These have some specific and some general utility for academics and students. The data base is an excellent device to store bibliographic material. Spread sheets have less obvious general applicability except for those disciplines -- such as business -- that are the primary users of the tool. It is less obvious that students need to acquire facility with these tools as a necessary part of literate in the electronic information arena.

Programming

Another class of computer skills is programming. Should students be required to learn a computer language as part of their undergraduate education? Let's distinguish between providing advanced courses in programming for the few students who want to specialize in computer science, and requiring that all students attain some rudimentary skills in programming. By and large, the trend in the information arena has been away from having individuals create their own programs to handle information. A handful of expert programmers have been creating increasingly powerful software packages that allow the ordinary user to avoid the painstaking job of developing personal software tools. The trend will continue, making general knowledge of programming of very limited utility. Programming might be included in the college curriculum for a number of reasons, but general literacy in the handling of electronic information is not an appropriate justification.

AN AGENDA OF ISSUES

The increasing use of electronic text raises a number of issues for college administrators and faculty.

Who Pays?

There are many costs associated with the type of information literacy discussed in this paper. There is the cost of purchasing and maintaining hardware -- microcomputers, data-handling telephone links, main-frame computers, and computer connect time. There is the cost of software -- word processing, terminal emulation, and various other programs that facilitate the exchange of electronic information. There is cost of providing training in the use of these tools, and the administrative coordination of these many activities. These costs cannot be hidden. Yet their size pose a challenge to fund raisers trying to meet the increasing costs of items of long-standing priority such as faculty salaries.

Teaching Information-handling Skills

Today, few campuses offer classes in the use of the tools of hard text -- handwriting, use of the library, and typing. It is commonly assumed that facility with these tools is a part of pre-college education. There are two exceptions to this. Libraries offer orientation sessions for students, and study-skills centers provide some of this training in writing and study habits for those in special need. By and large, however, it is assumed that these tools were acquired in previous schooling to a level sufficient to equip students to perform the usual academic tasks.

The electronic tools are too new to make this assumption. For some years special training needs to be provided on campuses. Should it be done through regular classes in the disciplines or provided separately through campus-wide workshops? By and large it would seem most appropriate to be done in the latter context. Too few faculty possess the requisite skills to teach students. Furthermore, most faculty probably feel that it is inappropriate for them to provide this training; after all, the skills in question are designed to enhance, not supplant, the normal academic activities. It is clear,

though, that faculty will need to acquire facility with these tools if they are to integrate their use into academic and instructional work.

Ultimately, if the skills of electronic information literacy are widely adopted by colleges, it will have implications for precollege instruction. Colleges must maintain open dialogue with secondary institutions during these times of transition.

Identification of the Appropriate Skills

In this paper I argue for the development of a variety of skills in the information literacy domain. It is not a definitive list, nor could there ever be one. Faculties on each campus should deliberate about which skills should be considered essential. At the present time, of course, the list is likely to include the ones that are identified by the campus innovators; certainly many of mine arise out of the experience of myself and colleagues who have been early adoptors of the technology. As more faculty gain experience with electronic text, and as hardware and software evolve, it is likely that the list will change.

An ingredient in campus debate should be the norms regarding shared or collaborative text. The highest values of student scholarship are associated with individual performance in scholarly activity. Electronic text invites both borrowing the ideas of others and borrowing from one's own prior electronic text. In the past, the very time and difficulty of combining the text of various authors was an inhibitor to sharing and borrowing. Electronic text changes this, and indeed may change the way many people write. Composition may become much more an act of assembling pieces of existing text than creating entirely new ideas. How does the academic community feel about this? What norms (or rules) shall we promulgate to our students in this regard?

Four Kinds of Research

The campus debate can be more informed to the extent that systematic research is conducted on the relevant issues. Four kinds of research are called for: documentation of usage patterns, assessment of implementation, measuring the impact on academic products, and assessing the psychological and social consequences.

Of great value is simply monitoring who uses what machines for what purposes. On any campus (or in any organization for that matter) it is important to document the kinds of uses being made of machines, and the centrality they have in the conduct of daily work. Students may be using the computers more for games than work; conversely, they may be using them extensively for class work. These data can inform decisions about university purchases or decisions to encourage students to purchase their own. On most campuses the growth of computer use has not been the result of a campus-wide policy. But policies emerge when activities become sufficiently widespread to require policy. The policy should be based on information.

Another focus for research is the process of implementation. As with any new systems introduced into an organization, it is important to identify potential problems with the implementation. What kinds of technical problems arise as students and faculty use computers? What are the limitations in the software being employed? Are there technical problems with the sharing of electronic text? Are the technical problems getting in the way of accomplishing the desired academic tasks? How are non-using faculty reacting to the introduction?

To understand the impact of the technology on scholarship and instruction systematic experiments need to be employed. For example, is teaching English composition enhanced by word processing? This question is best answered by randomly assigning students to two different sections of the course, one in which students use computers as they compose, and another in which they do not. Systematic observation of students and the products they produce provides the evidence. Based on similar experiments done in elementary schools, some hypotheses are that those using word processing will spend more time working on their compositions, write longer paragraphs, do more revisions and critique each other's work more often. Many of these outcomes would be valued in the college community, but their existence is only hypothesized; only research could tell if they are real outcomes.

In addition to the impact on the products created by students and faculty, there are a number of social psychological issues that bear investigation. The university is a community of faculty and students. A sense of community is built and maintained by many acts of interpersonal, face-to-face communication. As more communication is done with electronic text, instead of face-to-face with voice and non-verbal modes of interaction, many of the traditional cues will be lost. How does this influence people's perceptions? Does the opportunity to exchange more messages compensate for the seeming impersonality of the exchange?

Another set of issues surrounds the speed of information exchange in electronic text communication. For some, the computer might seem a demanding master, requiring ever-faster responses. Does it create tensions in those who use computers extensively? As the computer is used more extensively, new role demands will be created. For example, expectations of a department secretary might change extensively. Where formerly a high premium was placed on routine typing and telephone skills, the secretary might be expected to correct faculty papers using a word processor. Worse yet, the faculty may use more than one type of word processor, necessitating that the secretary mast several systems. A number of changed expectations could alter office relations and job satisfaction.

These research questions are offered as illustrations. They represent important issues, the answers to which can influence the way in which a campus community views these new innnovations in communication.

Literacy in electronic information handling must stand the test of scholarship and instruction. At present it is only the informed judgment of early adopters that these tools can contribute in a positive way to reasoned thinking and writing -- the central concern of the university. But this very assumption must be open to assessment and reassessment.

To maintain the enquiring spirit during a time of transition it is probably wise to remind students and faculty alike of the following.

In a technology-rich environment, speedily-obtained information and slick-appearing text is not equivalent to good scholarship or persuasive argument. The machines can be captivating, and delude their users into thinking that the mere mastery of their functions should be rewarded, because the product looks so appealing to the eye.

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